# 2. Guidelines for Addressing Road Management Issues

This section identifies road management issues, and suggests ways to address the issues that will assist road managers to effectively implement road-related Forest Plan management direction. Subsection 2.1 summarizes our findings regarding each of the issues. Subsection 2.2 lists guidelines that are suggested by the findings.

## 2.1. Issues

We identified seven broad issues that could be addressed at the forest scale. The findings of our analysis of each issue are summarized below. The detailed analysis supporting the findings and recommended guidelines for each issue is discussed in Appendix 3.

### 2.1.1. Affordability

Current and anticipated future funding levels are inadequate to maintain the existing road system in a stable and environmentally sound condition. Strategic use of the limited funding to reduce the maintenance workload will be essential to halt or reverse the degradation of road and environmental conditions.

**Findings**

- We anticipate that funding for maintenance and improvement of Forest Service roads will not increase substantially over the next three to five years.
- Current funding of routine maintenance is about 70% of what is needed to provide for safety, provide adequate resource protection, and preserve the road facilities (full custodial maintenance). With current funding:
  - Roads are not being maintained to full standard, or even to a full custodial level.
  - Safety is being adequately protected, and prevention of abnormal storm damage has been adequate.
  - Routine maintenance of proper surface drainage is not being fully achieved, resulting in road damage and excess sediment production.
  - A substantial deferred maintenance backlog has accumulated and continues to grow.
- In the near-term, road managers can most readily alter the costs of grading and ditch & culvert cleaning. Other routine maintenance costs are less responsive to management changes. The primary factors that affect these costs and which road managers can change are:
  - Use – restricting wet weather use reduces costs and has fairly low implementation costs.
  - Design – changing a road from the old, confined-drainage design style to the new, unconfined-drainage design style reduces costs, but is costly to implement.

- Objective Maintenance Level – ML3 roads are wider and maintained to a higher standard than ML2 roads. Conversion of a ML3 road to ML2 reduces costs, but is costly and there are only a limited number of ML3 available for conversion. Converting a ML2 road to ML1 (closing the road year-round) reduces costs, has low to moderate implementation costs, and a large number of roads that could be converted.
- Mileage – decommissioning a road reduces costs by reducing the total mileage of roads that need to be maintained. There are a large number of roads that could be decommissioned, but it is very costly to implement.

Table A3.1- 1 displays the range of savings and investment costs associated with several management changes.

**Table A3.1- 1- Investment Costs and Annual Savings for Various Management Changes**

| Management Change | Costs and Savings per Mile | | | |
|---|---|---|---|---|
| | ML2 | | ML3 | |
| | Savings ($) | Investment ($1000) | Savings ($) | Investment ($1000) |
| **Regulate Wet Weather Use** | 210 - 250 | 0.8 | 260 – 300 | 1.2 |
| **Convert to New Style** | 80 – 120 | 11.5 | 90 – 150 | 19.2 |
| **Close** | 110 – 410 | 0 – 4.6 | | |
| **Decommission** | 170 – 500 | 24.0 | | |
| **Convert ML3 to ML2** | | | 70 – 470 | 2.9 – 20.4 |

- We estimate that grading and ditch & culvert cleaning costs should not exceed about 75% of the total routine maintenance budget, in order to provide for full custodial level of routine maintenance. At the current funding level 75% would be about $320,000. Table A3.1- 2 displays the degree to which implementing the more feasible of the above-listed management changes could increase the overall affordability of the routine maintenance workload.

| Table A3.1- 2 – Costs of Feasible Management Strategies | | | | |
|---|---|---|---|---|
| | Annual Grading + Ditch & Culvert Cleaning Costs | | Capital Investment Needs ($1000) | Miles of Road Closed |
| Management Scenario | $1000 | % of Budget | | |
| **Current Situation** | 446.7 | 105% | 0 | 0 |
| **Restrict Wet Wx Use on All ML2 & ML3 Roads** | 342.3 | 80% | 372.6 | 0 |
| **Close 50% of ML2 Roads** | 327.0 | 77% | 1,559.7 | 555 |
| **Restrict Wet Wx Use ML2 & ML3 and Close 15% ML2** | 318.4 | 75% | 799.8 | 166 |

The last scenario appears to provide the most feasible model for reducing grading and ditch & culvert cleaning costs to target levels.

- The most critical portion of the deferred maintenance backlog is replacement of old culverts, because of the substantial sediment impacts and repair costs associated with culvert failure. Current needs exceed $1.6 million, and the majority of remaining culverts will be due for replacement within 10 years.
- Existing management direction under standards and guides for Facilities & Transportation provides adequate direction to manage the affordability of the road system. The results of this analysis support the existing Forest Plan management direction, and identify opportunities and guidance (refer to Guidelines section) to focus and improve its implementation.

## 2.1.2. Access

Road access is essential for the public's use and enjoyment of the Forest as well as for the management, protection, and utilization of forest resources. Unfortunately, it will not be possible to entirely avoid impacts to road access, whether from continued inadequate maintenance or from changes in management. Road managers and users, working together, face the challenge of minimizing impacts on the quality and quantity of access while improving affordability and resource conditions.

- Road access is the primary facilitator for local and regional communities to enjoy the social and economic benefits of the forest. Impacts to road access result in proportional impacts to those benefits.
- Up to 350 miles of roads in Late Successional Reserves are maintained at a higher level than needed for resource management. Some could be closed and managed at ML1, and others could be decommissioned.
- Most roads that provide access for timber management are expected to be retained, but some minor adjustments are anticipated:

  - A minor amount of new spur-road construction is needed to economically utilize the few timber management stands that do not already have road access.
  - Because of lower harvest volumes, some ML2 roads could be more appropriately managed as ML1.
- Tables A3.2- 1a-c display recreation use patterns that can be useful in estimating impacts of potential road management changes on recreation access.
  - Wet weather use restrictions could have substantial impacts on OHV recreation unless they are implemented in a flexible manner. If the flexible wet weather use restrictions currently in effect for OHV trails were extended to the road system in the OHV areas, impacts would be relatively minor.
  - Low use levels in other areas during the normal wet season would allow less flexible wet weather restrictions to be used without causing substantial impact.
  - Focusing road closures in areas with low recreation use can minimize impacts on recreation access.
- It appears that the need for wet weather use restrictions and some closure of ML2 roads can be accomplished in a way that does not have major adverse impacts on any of our major access needs.

## Table A3.2- 1a - Spatial and Seasonal Recreation Use Patterns

**Covelo Ranger District**

| Area or Destination | Percent of District Use | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Total Use | Season 1 | | Season 2 | | Season 3 | | Wet Season Use |
| | | Period | Use | Period | Use | Period | Use | |
| **General Area Use** | | | | | | | | |
| **Howard** | 13% | Aug 16 – Oct 31 | 12% | May 1 – Aug 15 | 1% | Oct 31 – Dec 15 | Tr | 2% |
| **Blands Cove** | 5% | Aug 16 – Oct 31 | 5% | May 1 – Aug 15 | Tr | Oct 31 – Dec 15 | Tr | 1% |
| **Keller** | 20% | Aug 16 – Oct 31 | 18% | May 1 – Aug 15 | 2% | Oct 31 – Dec 15 | Tr | 4% |
| **Hells ½ Acre** | 5% | Aug 16 – Oct 31 | 4% | May 15 – Aug 15 | 1% | | | 1% |
| **Covelo GFA** | 15% | Aug 16 – Oct 31 | 14% | May 1 – Aug 15 | 1% | Oct 31 – Dec 15 | Tr | 3% |
| **Sub Total** | **58%** | | | | | | | **11%** |
| **Destinations** | | | | | | | | |
| **Eel River CG** | 4% | Aug 16 – Oct 31 | 4% | May 1 – Jul 15 | Tr | Jul 16 - Aug 15 | Tr | 1% |
| **Howard / Little Doe** | 18% | Aug 16 – Oct 31 | 17% | May 1 – Jul 15 | 1% | Jul 16 - Aug 15 | Tr | 3% |
| **Hammerhorn CG** | 11% | Aug 16 – Oct 31 | 10% | May 1 – Jul 15 | 1% | Jul 16 - Aug 15 | Tr | 2% |
| **Soldier Ridge TH's** | 6% | Aug 16 – Oct 31 | 4% | May 1 – Jul 15 | 2% | Jul 16 - Aug 15 | Tr | 1% |
| **Greensprings TH** | 2% | Aug 16 – Oct 31 | 1% | May 1 – Jul 15 | Tr | Jul 16 - Aug 15 | Tr | Tr |
| **Sub Total** | **42%** | | | | | | | **7%** |
| **Overall Percent of District Use Occurring in Wet Season** | | | | | | | | **18%** |

| Table A3.2- @2 - Spatial and Seasonal Recreation Use Patterns<br>Grindstone Ranger District | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Percent of District Use | | | | | | | |
| Area or Destination | Total Use | Season 1 | | Season 2 | | Season 3 | | Wet Season Use |
| | | Period | Use | Period | Use | Period | Use | |
| **General Use Areas** | | | | | | | | |
| **Stonyford OHV** | 27% | Oct 1 – May 31 | 22% | Aug 16 – Sep 30 | 4% | Jun 1 – Aug 15 | 1% | 16% |
| **Grindstone GFA** | 19% | Aug 16 – Oct 31 | 16% | May 1 – Aug 15 | 2% | Nov 1 – Dec 15 | 1% | 4% |
| **Doe Peak** | 3% | Aug 16 – Oct 15 | 2% | Oct 16 – May 31 | 1% | Jun 1 – Aug 15 | Tr | 1% |
| **Sub Total** | **49%** | | | | | | | **21%** |
| **Destinations** | | | | | | | | |
| **Fouts** | 25% | Oct 1 – May 31 | 20% | Aug 16 – Sep 30 | 4% | Jun 1 – Aug 15 | 1% | 14% |
| **Letts-Boardman** | 14% | Apr 16 – Sep 15 | 13% | Sep 16 - Thxgiving | 1% | Mar 16 – Apr 15 | Tr | 1% |
| **Little Stony** | 3% | Oct 1 – May 31 | 2% | Aug 16 – Sep 30 | Tr | Jun 1 – Aug 15 | Tr | 2% |
| **Plaskett** | 6% | May 25 – Sep 15 | 3% | Sep 16 – Oct 31 | 3% | Snowplow – May 24 | Tr | 1% |
| **Ides Cove TH** | 1% | May 20 – Jul10 | 1% | Jul 11 – Oct 31 | Tr | | | Tr |
| **Sub Total** | **51%** | | | | | | | **18%** |
| **Overall Percent of District Use Occurring in Wet Season** | | | | | | | | **39%** |

| Table A3.2- 1c – Spatial and Seasonal Recreation Use Patterns<br>Upper Lake Ranger District | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Percent of District Use | | | | | | | |
| | | Season 1 | | Season 2 | | Season 3 | | Wet Season Use |
| Area or Destination | Total Use | Period | Use | Period | Use | Period | Use | |
| **General Use Areas** | | | | | | | | |
| **Upper Lake South** | 2% | Jul 1 – Sep 30 | 2% | | | | | Tr |
| **Upper Lake OHV** | 12% | Oct 1 – May31 | 12% | Jun 1 – Sep 30 | 1% | | | 8% |
| **Pillsbury North** | 7% | Aug 16 – Oct 15 | 6% | Jun 15 – Aug 15 | 1% | | | Tr |
| **Hells ½ Acre** | 5% | Aug 16 – Oct 15 | 4% | Jun 15 – Aug 15 | Tr | | | Tr |
| Sub Total | **26%** | | | | | | | **8%** |
| **Destinations** | | | | | | | | |
| **Lake Pillsbury** | 36% | May 16 – Sep 15 | 34% | Sep 16 – May 15 | 2% | | | 1% |
| **OHV Staging Areas** | 38% | Oct 1 – May 31 | 36% | Jun 1 – Sep 30 | 2% | | | 26% |
| Sub Total | **74%** | | | | | | | **27%** |
| **Overall Percent of District Use Occurring in Wet Season** | | | | | | | | **35%** |

## 2.1.3. Water Quality and Aquatic Habitat

Certain portions of the existing road system generate sediment that impacts water quality and aquatic habitat. Such impacts are more detrimental when they occur in watersheds that provide habitat for Threatened, Endangered, or Sensitive anadromous fish species.

**Findings** – We organized the findings into two categories. The first category deals with aquatic resources that are subject to road impacts on the Mendocino NF. The second category deals with the sources of potential impacts to those aquatic resources.

### Aquatic Resources Subject to Road Impacts

- The primary beneficial uses of water on the Mendocino include anadromous and resident fisheries, other aquatic and riparian species, and reservoir storage.
- We rated the relative value of aquatic resources of the 5th field watersheds based on the presence of fish habitat.
  - Presence of anadromous habitat warranted a high rating, as several of our existing or historic anadromous stocks are federally listed as Threatened or Endangered. Impacts to these species carries greater risk of irreparable harm.
  - Presence of a substantial resident trout fishery warranted a medium rating, as trout are sensitive to sediment impacts
  - Watersheds without either of the above aquatic resources were rated low, as they are least sensitive to the known potential impact sources.
- Reservoir storage is less sensitive to impacts than are the fish and other aquatic and riparian species. Therefore, the presence or absence of reservoirs within or downstream of a 5th field watershed did not affect its aquatic resource rating.
- The relative values of aquatic resources of the 5th field watersheds are displayed in Table A3.3 – 6.

### Sources of Potential Impacts

<u>Poaching</u>

- Poachers are known to use roads and trails to reach the Middle Fork of the Eel and the Black Butte River to take Threatened steelhead.

<u>Migration Barriers</u>

- Fish migration barriers are not considered to be a significant problem on the Mendocino.
- Twenty stream crossings were found to be barriers to resident fish.
- There are no known barriers to anadromous fish.

- TableA3.3 -7 displays information regarding the location and nature of fish migration barriers, including the urgency of correcting each situation.

Sediment Production

***Magnitude and Context***

- Roads probably contribute about 3% to 7% of the average annual sediment production from both natural and human causes. This includes both surface erosion and mass wasting sources.
- Sediment from roads and other human causes does not appear to be in excess of the sediment transport capabilities of the stream systems on the Forest.
- Road system does not affect municipal or community water systems.
- Road sediment probably does result in localized impairment of aquatic habitat in the form of turbidity and siltation in some areas.

***Location of Potential Impacts***

GIS analysis identified the locations of the highest indicators of potential road sediment impacts. Road-specific locations were determined for key routes only, using GIS analysis and available road-specific condition information. Watershed-specific locations were determined using GIS analysis of both key and non-key routes, but included no road-specific condition information.

*Key Routes*

- The 375 miles of key routes on the Forest are predominantly ML3 or ML4, which have wider road prisms than most other Forest roads. This tends to increase the potential magnitude of impacts resulting from design or location problems as compared to other roads.
- There are about 15 miles (4%) of key routes located on unstable lands.
- There are about 99 miles (26%) of key routes located within 150 feet of streams[1].
- Key routes cross 1096 streams, which equates to an average of 2.9 crossings per mile. This is within 16% of the forest-wide average of 2.5 crossings per mile.
- One key route (M-1) is located on two floodplains (Soda Creek and Gravelly Valley). There are chronic problems with sediment deposition at two stream crossings in Gravelly Valley, due to a combination of faulty bridge design and alteration of the local base level by Lake Pillsbury.
- No key routes are located on wetlands.
- Key routes were rated for potential sediment impacts as follows:
  - Key routes that have above average level of indicators of potential sediment impact and are located in high sediment 5th field watersheds were rated high.

[1] Inludes order 1 intermittent streams.

- Those that have above average level of indicators of potential sediment impact but are not located in high sediment 5th field watersheds were rated medium.
- Others were rated low.
- Detailed information upon which the ratings are based is displayed in Table A3.3 –25.

*Fifth Field Watersheds*

- Of the three key watersheds on the Forest, Upper Middle Fork Eel River have the lowest rating in road indicators expressing potential man-induced sediment from roads. Thatcher/Williams watershed was rated moderate from impacts whereas the Black Butte River was rated the highest.
- 5th field watersheds are rated for potential road related sediment impacts in Table A3.3 –18. The ratings are comparisons of the *indicators* of sediment *potential* of the watersheds relative to each other. We could not determine at this scale, with the available data, the *actual* sediment *impacts*. That task will have to be done in the watershed/project scale analysis, supported by the collection of road-specific inventory data.
- Table A3.3 –19 displays the indicators of sediment potential of 7th field watersheds, which is useful information for focusing analysis and improvement work at the watershed/project scale.

***Influence of Design, Use, and Climate***

We analysed the general influence of several road characteristics on sediment delivery to the stream system from road related surface erosion. The characteristics we analysed were: design style, wet weather use, road width, and climate zone. The first three characteristics were important because they have a strong influence on sedimentation rates and can be changed by management. The influence of climate zone was analysed because similar management changes result in greater sediment reductions in one zone than in the other. Knowledge of the nature and magnitude the influences of these characteristics is important in prioritizing sediment reduction efforts.

A brief explanation of the terms we use to describe these four characteristics is in order before discussing our findings.

- Design Style – Two styles were analysed, referred to as ‘old’ and ‘new’. Old style roads are predominantly of a confined drainage design, characterized by an insloped running surface, inboard ditches and outboard berms. New style roads are predominantly of an unconfined drainage design, characterized by an outsloped running surface, and with minimal inboard ditches and outboard berms.
- Wet Weather Use – Two regimes were analysed: unrestricted and restricted. The unrestricted use regime results in more severe rutting, which in turn increases the sediment rate.
- Road Width – We analysed two nominal road widths, 15 and 25 feet, to represent typical dimensions of maintenance level 2 and maintenance level

3 roads, respectively. These are referred to as ML2 and ML3 in the text and tables.

- Climate Zone – Two zones were analysed: a rain + snow zone (500 to 5000 feet elevation) and a snow zone (over 5000 feet elevation).

We analysed the influence of various combinations of these characteristics. For brevity, distinct combinations of characteristics are referred to in the discussion and tables as 'Typicals'. The results are summarized in Tables A3.3 –1, A3.3 –2, A3.3 -3, below.

**Table A3.3 -1 - Comparison of Estimated Sediment Rates Among Typicals**

| | | Avg Sediment Delivery2 (tons/mi/yr) | | | |
|---|---|---|---|---|---|
| | | Rain + Snow Zone | | Snow Zone | |
| Design Style | Wet Wx Use | ML2 | ML3 | ML2 | ML3 |
| Old | Unrestricted | 108 | 166 | 51 | 89 |
| | Restricted | 94 | 146 | 40 | 75 |
| New | Unrestricted | 95 | 158 | 48 | 85 |
| | Restricted | 51 | 119 | 18 | 56 |
| New + Gravel | Unrestricted | | 62 | | 11 |
| Recently Closed | | 47 | | 13 | |

2 Tonnage figures are most valuable for comparison purposes. They are averages for 'typical' characteristics of each road design type and wet weather use regime. The actual magnitudes of the rates are accurate to only +/- 50% (Eliot, et al, 1999), so their use for estimating actual sediment production is limited. In comparison to the estimated average sediment rate of 49 tons per mile from the Eel & Mad River Basin sediment study (USDA 1970), these estimates appear to be somewhat high, but within the stated accuracy range.

| Table A3.3 -2 - Effects of ML2 Management Changes on Sediment Rates | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Current Management | | Reduced Sediment per Management Change | | | | | | | |
| | | | Restrict Use | | Convert to New Style | | Convert to New + Restrict | | Close3 | |
| Zone | Design Style | Wet Wx Use | Tons | % | Tons | % | Tons | % | Tons | % |
| Rain + Snow | Old | Unrestricted | 14 | 13% | 13 | 12% | 57 | 53% | 61 | 56% |
| | | Restricted | | | | | 43 | 46% | 47 | 50% |
| | New | Unrestricted | 44 | 46% | | | | | 48 | 51% |
| | | Restricted | | | | | | | 4 | 8% |
| Snow | Old | Unrestricted | 11 | 22% | 3 | 6% | 33 | 65% | 38 | 75% |
| | | Restricted | | | | | 22 | 55% | 27 | 68% |
| | New | Unrestricted | 30 | 63% | | | | | 35 | 73% |
| | | Restricted | | | | | | | 5 | 28% |

| Table A3.3 -3 - Effects of ML3 Management Changes on Sediment Rates | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Current Management | | Reduced Sediment per Management Change | | | | | | | |
| | | | Restrict Use | | Convert to New Style | | Convert to New + Restrict | | Convert to New + Gravel | |
| Zone | Design Style | Wet Wx Use | Tons | % | Tons | % | Tons | % | Tons | % |
| Rain + Snow | Old | Unrestricted | 20 | 12% | 8 | 5% | 47 | 28% | 104 | 63% |
| | | Restricted | | | | | 27 | 18% | 84 | 58% |
| | New | Unrestricted | 39 | 25% | | | | | 96 | 61% |
| | | Restricted | | | | | | | 57 | 48% |
| Snow | Old | Unrestricted | 14 | 16% | 4 | 4% | 33 | 37% | 78 | 88% |
| | | Restricted | | | | | 19 | 25% | 64 | 85% |
| | New | Unrestricted | 29 | 34% | | | | | 74 | 87% |
| | | Restricted | | | | | | | 45 | 80% |

We can draw the following conclusions from this information:

3 This assumes new design style, freshly graded prior to closure, and no revegetation or mulching of the running surface. This is the initial rate immediately after closing; the rate would decrease gradually as natural revegetation occurs on the running surface in the absence of traffic.

*General*

- Road mileage is a crude and not very useful measure of sediment impacts. Relying solely on reducing road mileage is a poor strategy for reducing impacts to aquatic resources.
- A variety of manageable factors, in addition to road mileage, influence sediment impacts.
- A variety of management actions, in addition to road closure, are available to reduce sediment impacts while meeting other environmental and socio-economic needs.

*Influence of Design Type and Wet Weather Use*

- Old style roads with unrestricted wet weather use have the highest sediment rates.
- Restricting wet weather use on old style roads reduces sediment rates as much or more than reconstructing to the new style without restricting use.
- Restricting wet weather use on new style roads that are currently unrestricted can substantially reduce sediment rates further.
- Management changes on roads in the rain + snow zone achieve substantially greater sediment reductions than similar changes on roads in the snow zone.
- Current Equivalent Roaded Acre methodology for quantifying cumulative watershed effects does not account for these differences in assessing the variable contribution of roads to cumulative effects.

*Influence of Climate Zone*

- Roads of similar design and use regime produce substantially more sediment (about double) in the rain + snow zone than in the snow zone. Conversely, similar changes in design and /or use regime can be expected to achieve substantially greater sediment reductions in the rain + snow zone than in the snow zone.
- According to information in Table A3.3 – 17, about 75% of the road system is in the rain + snow zone.
- The previous two points indicate that the greatest opportunity for sediment reduction is in the rain + snow zone.

**Need for Forest Plan Amendment**

Existing management direction under standards and guides for Facilities & Transportation, Soils & Geology, and Watershed & Water Quality provide adequate direction to manage the road system to protect water quality and aquatic habitat. The analysis did identify opportunities and guidance (refer to Guidelines section) to focus and improve implementation of Forest Plan management direction.

## 2.1.4. Terrestrial Habitat

Excessive road density (miles of roads per square mile) in some areas adversely affects the quality of wildlife habitat. This can lead to fragmented habitat and disturbance to the species. Roads also serve as invasion routes for noxious weeds, which can have severe, long-term impacts on ecosystem conditions and processes. Sensitive plant populations located near or adjacent to roads can be impacted by road maintenance, and by dust created from the use of the roads.

**Findings**

**Wildlife Species**

- Roads can add to habitat fragmentation. Analysis indicates that the Late-Successional Reserves are more affected by habitat fragmentation than areas outside of them. The impacts of habitat fragmentation are best conducted at the watershed or project level.
- Due to the narrow road width, low traffic density, and low rate of speed vehicles can travel on most forest roads, it is unlikely the roads will act as a barrier to terrestrial species movement. These same conditions will also result in low numbers in road kill animals.
- Road density was evaluated on a 5$^{th}$ field watershed basis, looking at all roads and just open roads. Only roads with the Forest Routed system were used for this analysis. The rating system was only designed to give priority to when a watershed should be reviewed. Ten watersheds have a rating of high, with four of them being high both for all roads and open road density; six were rated as medium; and six were rated at low (refer to Table A3.4- 2). Impacts from road densities should be determined at the watershed and project level and should be designed to answer questions for the species of concern for those areas.
- Species sensitive to disturbance can be impacted by roads or by activities associated with or made accessible by roads. The impacts of disturbance should be reviewed at the watershed or project level.
- While roads provide access for illegal activities that can lead to habitat loss or physical removal of species, the level of impact of these actions have not been documented for the Forest.
- Habitat improvement projects can be accessed and completed safer and cheaper with a certain level of road networks. Roads can also be used to protect forest habitat with wildfire suppression and to aid in fuel reduction projects.

**Botanical Species**

- Road maintenance can impact sensitive species located adjacent or within the road prism through direct removal of the plants or by changing hydrological patterns. There are three key route roads where changes in hydrologic flows are a concern. These are 24N21, M1b and M61.
- Soil stabilization work associated with road systems can involve the use of fertilizer and herb or forb seeds. In serpentine soils the use of fertilizer

can adversely affect native species by temporarily stimulating the growth of undesirable introduced species. For key routes this would affect M22.

- Not all roads within the Forest boundary are managed by the Forest Service, so the potential exists for Forest Service sensitive species to be impacted by other groups' road maintenance or reconstruction activities. Not shown as an issue for key routes.

**Noxious Weeds**

- The Mendocino N.F. faces a serious loss of native flora and habitat due to noxious weed incursion and spread; there is ample evidence that vectors moving along road corridors act as the most significant mode of spread for non-native species.
  - Weeds are often restricted to the disturbed shoulder soil of the road corridor. Weeds spreading along the road corridor are a forest scale problem.
  - The road corridor can also act as a staging point for invasive weeds that spread into adjacent native habitats. Weeds leaving the road corridor and infesting native habitat is an incident, or project scale problem.
- There are a number of reasons why roads act as corridors of spread for noxious weeds; most occur at a forest scale.
  - Road shoulders consist of regularly disturbed soils: a prime characteristic of weedy habitat. Forest scale.
  - Roads attract vehicles, animals (domestic and wild), and humans that act as vectors of weed seed spread. Forest scale.
  - Recurring generations of seed producing weeds, combined with road maintenance such as grading and ditching, create deep and well-populated weed seed banks. Forest scale.
  - Road disturbance is not restricted to a corridor, roads can alter the microclimate surrounding them; this could occur at project, watershed, or forest scale.
- Although passenger vehicles have been found to carry weed seeds over great distances, the numbers of seeds found are so low that Forest resources are best spent on detecting and eradicating weed infestations as they occur (using weed surveys), rather than trying to control tourist vehicle movement into the forest. Both the movement of these vehicles, and the weed surveys occur at a forest scale.
- Any decommissioning of roads would be beneficial to weed control; however, these roads must be surveyed for several years after decommissioning since noxious plants and seed banks could persist, and would no longer be detected by a road survey. Roads would be decommissioned on a project scale.
- Sudden Oak Death (SOD), a condition caused by the fungal pathogen *Phytophthora ramorous*, has caused the death of thousands of oaks in California. Originally restricted to coastal sites, SOD did not appear to be a threat to xeric, interior landscapes such as the Mendocino N.F. However,

SOD now appears to be moving inland; documented cases have been found as far inland as Napa and Solano counties. Although not confirmed, experts believe that SOD may have been found in Placer County, on the west side of the central valley. If this turns out to be the case, the Mendocino N.F. would be directly in the path of the spread of SOD. The Forest should be prepared to implement a number of measures to control and eradicate SOD; an infestation would be controlled on a watershed and forest scale.

**Need for Forest Plan Amendment**

- There is a need to review the road density values used in the habitat capability models for the fisher and marten. The review should survey current subject matter literature to determine if the values in the capability models are appropriate or if they should be updated.

## 2.1.5. Heritage Resources and Traditional Uses

Some significant sites are experiencing vandalism that is facilitated by nearby road access. Roads provide access for traditional and cultural uses.

**Findings**

- Key routes in the northern and southern parts of the Forest provide access to historic properties and areas having cultural, symbolic, spiritual, sacred, traditional, or religious values to at least seven federally recognized tribes, and to religious and spiritual practitioners who use these areas. These historic properties, and areas possessing traditional, cultural, sacred, and other values of importance to tribes and individual practitioners, are distinct locations rather than expansive landscapes. Known vandalism and archaeological site damage is also restricted to a few areas. It is unlikely, however, that these key routes would be subject to closure, decommissioning, or lowering of maintenance standards that would affect current access. Easy access facilitates illegal artifact collection, vandalism, and road damage at historic properties. Actions to alleviate these effects, and other actions that may affect access or other values associated with these key routes, should be assessed at the watershed or project-level scales.
- Key route M1c provides direct access to several different areas having cultural, symbolic, spiritual, sacred, traditional, or religious values to the Round Valley Indian Tribes, and to individual Yuki spiritual practitioners. These same areas are also historic properties. Spiritual practitioners are known to use one specific locality on a regular basis. Because it is unlikely that these key routes would be closed or decommissioned, access to areas important for spiritual, traditional, or cultural practices would not be affected.
- Key route M1c, however, also provides indirect public access within the Williams-Thatcher watershed to historic properties where vandalism is

occurring, and road use is affecting archaeological sites. Archaeological sites and properties having cultural, symbolic, spiritual, sacred, traditional, or religious values to the Round Valley Indian Tribes and to individual Yuki spiritual practitioners are being affected. Easy public access is a contributing factor to repeated acts of vandalism at these properties. These effects, however, should be addressed at the project-specific or watershed analysis level.

- Portions of key routes FH7 and M4 follow the original route of the historic Nome Cult Trail (NCT), which possesses cultural, spiritual, and symbolic values to at least seven federally recognized tribes. Much of the NCT also follows other non-key route roads. The Nome Cult Trail is the route used by the military to relocate many northern Sacramento Valley Indians to the Round Valley Indian Tribes in 1863. Annual events, including organized commemorative walks and vehicular trips along the route, mark the historic and cultural importance of this trail. Continued access to the Nome Cult Trail, whether it is by key routes or other Forest system roads, is important to these tribes. Access could be affected by changes in road maintenance standards, road decommissioning, or closure. It is unlikely that the key route segments coinciding with the NCT route would be subject to closure or decommissioning. The likelihood that other non-key route roads would be subject to closure or decommissioning, however, is also considered low. Potential changes in access should be addressed at the project-specific or watershed scales of analysis.
- A short segment of the Nome Cult Trail follows the Twin Rocks Ridge road (20N02). This short segment may be more subject to closure than any other parts of the NCT because of its proximity to the Black Butte River. Because most of the public and tribal members wishing to follow the NCT more commonly use a nearby key route (FH7), closure would have little effect on current use. This issue should be addressed at the project-specific or watershed scales.
- Key routes M1f, M1b, and M6 provide access to Bloody Rock, a historic property important to the Round Valley Indian Tribes and other federally recognized tribes for its symbolic, cultural, and other values. Other key routes also provide access: CA301, CA2408, M61, and M1c. Bloody Rock is the location of a late 19$^{th}$ Century massacre of Native Americans (Powers 1872; 1877), and is important to local tribes as a symbol of the conflict between White settlers and California Indians. It is unlikely that these key routes would be subject to closure, decommissioning, or lowering of maintenance standards.
- Direction in the Forest Land and Resources Management Plan (LRMP) is adequate to ensure that road management decisions have considered the potential effect on historic properties, or traditional or cultural uses by Native Americans. LRMP direction incorporates regulations of the Advisory Council on Historic Preservation (36 CFR 800), requiring the consideration of potential effects to historic properties, including traditional cultural properties, in the decision making process. LRMP direction also

requires coordination with tribes to ensure Forest management practices do not unduly impede access to important traditional and cultural resources. And LRMP direction requires consultation with tribes and individuals to identify sites of traditional importance, and provide for their protection.

### 2.1.6. Health and Safety

Roads that are located on serpentine or ultramafic rock types may pose a potential asbestos hazard for adjacent campers or residents, road maintenance workers, and others who travel such roads frequently. Some members of the public have expressed concern regarding the effects of inadequate maintenance on safety on certain roads. Native Americans and others who gather plant materials are concerned about potential health effects if herbicides are applied to roadside vegetation.

- Potential for human exposure to asbestos from roads located on ultramafic rock types:
  - Bedrock geology maps show a large band of ultramafic rocks located along the east edge of the Forest that potentially contain asbestos. Smaller intrusions exist near Lake Pillsbury and on Etsel Ridge.
  - Table 2- 1 displays the potential for road-related asbestos exposure by 5$^{th}$ field watershed. Table A3.6- 1 in Appendix 3.6 displays information upon which the ratings are based, such as road mileages on ultramafic rock types, and the potential for human exposure to asbestos if it is present.
  - There are about seven miles of key routes located on ultramafic rock types.
  - Table 2- 2 rates key routes for potential asbestos exposure. Table A3.6- 2 in Appendix 3.6 displays information upon which the ratings are based, such as mileages of key routes on ultramafic rock types, and the potential for human exposure to asbestos if it is present.
  - Key routes traversing ultramafic rock units that may contain asbestos are located in 5$^{th}$ field watersheds of Red Bank, Elder Creek, Thomes Creek, Grindstone Creek, Middle Fork Stony Creek, Black Butte River, Williams/Thatcher and Upper Main Eel River.
  - There are about 65 miles of classified roads traversing ultramafic rock types.
  - Watersheds with the most roads located on ultramafic rock areas are Middle Fork Stony (19 miles) and Thomes Creek (13 miles). Next highest watersheds are Elder Creek (7 miles) and Little Stony Creek (5 miles).
  - Previous sampling of some serpentine soil samples from the south end of the Forest determined that asbestos fibers that were present were not of the carcinogenic type. However, additional testing will be required under the new air quality regulations.

- Grading under dry soil conditions results in greater levels of traffic related dust. If done on high use roads or roads near human habitation, it can result in health and safety problems.
- There are no vehicle accident report findings that attribute the cause to poor road maintenance. The most common causes are driver error, including driving under the influence of alcohol or other substance.
- There is currently no roadside pesticide spraying done by the Forest Service, nor is there any planned. However, there could be future proposals.

### 2.1.7. Effects on Roadless Areas

There are some unclassified roads known to occur within inventoried roadless areas. Forest Service policy requires such roads to eventually be either closed or added to the classified road system. The potential need for new road construction within inventoried roadless areas during our current Forest Plan period is low.

- There are unclassified roads in roadless areas that need to be inventoried and assessed for access needs during watershed scale analysis. Policy requires that those that are needed be added to the classified road system, and others be decommissioned or converted to other uses such as trails.
- There is low potential need for constructing new roads in roadless areas. Timber management is about the only activity that can afford to build roads, and only about 2% of roadless areas are allocated to timber management.
- The potential effects of any future proposals to construct new roads would be unique to the specific roadless area that would be affected. Therefore, such effects are best addressed at the watershed or project scale.

## 2.1.8. Location and Priorities of Issues

The following two tables rate key routes and 5th field watersheds for the level of concern for some of the issues or issue components. Not all issues were amenable to this type of rating. Detailed information on the factors that contributed to the ratings can be found in Appendix 3, as footnoted.

**Table 2- 1 - Watershed Issue Rating Matrix**

| Watershed Name | Sediment Potential[4] | Aquatic Habitat[5] | Road Density[6] | Noxious Species[7] | Heritage & Traditional[8] | Asbestos[9] |
|---|---|---|---|---|---|---|
| Bear Creek | L | M | L | L | L | L |
| Black Butte River | H | H | H | M | M | M |
| Briscoe Creek | H | M | H | M | L | L |
| Elder Creek | L | L | H | L | L | M |
| Elk Creek | H | M | H | H | L | L |
| Grindstone Creek | L | H | H | L | H | M |
| Lakeport | H | M | L | L | L | L |
| Little Stony Creek | L | L | M | L | L | H |
| Middle Fk Stony Cr | M | M | M | H | L | H |
| North Fk Cache Creek | M | L | M | L | L | L |
| North Fk Stony Creek | M | M | H | L | L | L |
| North Fork Eel River | M | M | L | L | L | L |
| Red Bank Creek | L | H | L | L | L | M |
| Rice Fork | L | L | H | M | L | L |
| S Fk Cottonwood Cr | H | M | L | L | L | L |
| Soda Creek | H | M | H | L | L | L |
| Thomes Creek | H | H | H | M | H | M |
| Tomki Creek | L | H | L | L | L | L |
| Upper Lake | H | M | M | M | L | L |
| Upper Main Eel River | L | H | H | M | L | M |

[4] Appendix 3.3, pages 32 – 40, Tables A3.3-18 & 19.
[5] Appendix 3.3, pages 11, 12, Table A3.3-6.
[6] Appendix 3.4, pages 9 & 10, Table A3.4-2
[7] Appendix 3.4, pages 26 & 27, Table A3.4-5
[8] Appendix 3.5, pages 11 & 12, Table A3.5-1.
[9] Appendix 3.6, pages 3 & 4, Table A3.6-1

| Table 2- 1 - Watershed Issue Rating Matrix | | | | | | |
|---|---|---|---|---|---|---|
| **Watershed Name** | **Sediment Potential[4]** | **Aquatic Habitat[5]** | **Road Density[6]** | **Noxious Species[7]** | **Heritage & Traditional[8]** | **Asbestos[9]** |
| Upper Middle Fork Eel | M | M | H | H | L | L |
| Williams-Thatcher | H | M | M | L | H | M |

| Table 2- 2 - Key Routes Issue Rating Matrix | | | | |
|---|---|---|---|---|
| | | **Issue Ratings** | | |
| **Map Label** | **Route Description** | **Sediment Potential[10]** | **Noxious Weeds[11]** | **Asbestos Potential[12]** |

[10] Appendix 3.3, page54, Table A3.3-26.
[11] Appendix 3.4, pages 23 – 25, Table A3.4-4.
[12] Appendix 3.6, page 5, Table A3.6-2.

| Table 2- 2 - Key Routes Issue Rating Matrix | | | | |
|---|---|---|---|---|
| | | Issue Ratings | | |
| Map Label | Route Description | Sediment Potential[10] | Noxious Weeds[11] | Asbestos Potential[12] |
| M22 | M22 from Forest bdy to jct w/M2 | L | M | H |
| M2 | M2 | H | H | L |
| 23N39 | 23N39 Espee Ridge tie through | H | L | L |
| 24N01 | East 24N01 from jct w/M2 to Kingsley Glade | H | L | L |
| M4 | M4 from Forest bdy to jct w/M2 near Government Flat | L | L | L |
| M1b | M1 from Eel River Station to jct w/M21 | H | L | L |
| 24N21b | 24N21 from jct w/Hwy 162 to jct w/24N13 near Blands Cove | H | M | L |
| FH7 | FH7 | H | H | L |
| M1c | M1 from Eel River to jct w/M61 | L | L | H |
| M61 | M61 | L | H | M |
| CR311 | Slapjack | L | L | L |
| M3b | M3 from jct w/ top of Slapjack to jct w/M6 | L | L | L |
| M3c | M3 from jct w/M6 to Ivory Mill | L | L | L |
| M6 | M6 | H | L | L |
| M3d | M3 from Ivory Mill Saddle to jct w/Crockett Trailhead spur. | H | M | L |
| M1e | M1 from Cabbage Patch to Soda Creek | H | H | L |
| CR301 | Lake CR301 from Soda Creek to jct with Mendocino CR 240B | H | L | L |
| CR240B | Mendocino CR240B from jct w/Lake CR301 to jct w/M8 | L | L | L |
| M1f | M1 from Soda Creek to Forest boundary (Lake CR301) Access from Upper Lake to Pillsbury Basin | H | H | L |
| M10 | M10 | M | M | L |
| 17N02 | 17N02 | M | H | L |
| 16N30 | 16N30 form Sam Alley Ridge to near High Glade | M | L | L |

| Table 2- 2 - Key Routes Issue Rating Matrix | | | | |
|---|---|---|---|---|
| | | Issue Ratings | | |
| Map Label | Route Description | Sediment Potential[10] | Noxious Weeds[11] | Asbestos Potential[12] |
| 16N01 | 16N01 | L | H | L |
| M5a | M5 from jct w/M10 to jct w/Little Stony Rd | M | L | L |
| M5b | M5 from jct w/ Little Stony Rd to Pacific Ridge Station | M | L | M |
| M12 | M12 (CR303 – Lake) | M | L | L |

## 2.2. Guidelines

These guidelines are intended to assist watershed/project scale roads analysis and to help inform road management decisions that implement Forest Plan management direction. They do not constitute new management direction nor site-specific decisions. Rather they provide recommended ways to most effectively implement existing management direction.

The guidelines are organized according the road management activities to which they apply. The first three activities are related to road management planning; the other four are direct road management activities. Under each activity, guidelines are organized according to the issues that they address. The analysis supporting these recommended guidelines is in Appendix 3.

### 2.2.1. Need for Forest Plan Amendment

- There is a need to review the road density values used in the habitat capability models for the fisher and marten. The review should survey current subject matter literature to determine if the values in the capability models are appropriate or if they should be updated.

### 2.2.2. Identifying Opportunities and Setting Priorities

There is no single order of priority that we can prescribe that fits all situations. The following recommendations provide some technical guidance that can help identify work that will do the most good to fix specific types of problems. However, they don't address the relative priority between types of problems, such as whether reducing aquatic habitat impacts should be of higher or lower priority than reducing fragmentation of terrestrial habitats.

That aspect of prioritizing road management activities must consider a variety of non-technical factors, such as the specific objectives of available funding and/or partners, potential efficiencies of coordinating with other work, etc. These factors are outside the scope of roads analysis, but are vital to the ongoing process of integrating road management with overall forest management.

For these reasons, we tried to format these prioritization guidelines to be easily related to the specific issue or issues that a road manager needs to address. Hopefully road managers will be able to identify the recommendations that are of most relevance to prioritizing the program of work as it evolves through shifting funding emphasis and partnerships.

*Affordability*

- When reducing annual maintenance costs is the primary objective, prioritize investment in road management changes according to the investment recapture period. Consider investment recapture period when prioritizing investments in management changes that have other primary objectives.
- Replacement of old culverts with high risk of failure should receive highest priority for deferred maintenance funding.

- For affordability purposes, unneeded roads with a high percentage of their culverts needing replacement should have the highest priority for decommissioning.
- Unneeded roads with the highest maintenance costs should have the next highest priority.

*Access*

- Assure that closure or decommissioning for the purpose of improving resource conditions or affordability occurs on the least needed roads.
- Focus the more expensive resource-protection road improvements on the most needed roads.

*Water Quality & Aquatic Habitat*

- Tables 2.2 –1 and 2.2 - 2 provide aquatic resource and sediment rankings of the 5th field watersheds for consideration when prioritizing watershed/project-scale road analysis or improvement work. Table A3.3 – 19 (in Appendix 3.3) provides additional information regarding sediment potential of 7th field watersheds that is useful for prioritizing work within 5th field watersheds.
- When prioritizing watershed/project scale roads analysis and inventory efforts**,** assigning higher priority to 5th field watersheds that have higher ranking in both the 'Aquatic Resource' and 'Sediment' categories will assure that situations that have the greatest potential need for improvement are assessed and improved first (order of ranking would be H&H > H&M > M&M > M&L > L&L).
- Pending completion of watershed-scale roads analysis, the same ranking scheme can be used to prioritize potential sediment reduction projects.
- Within high priority 5th field watersheds, aquatic habitat will benefit most by prioritizing sediment reduction projects according to the cost per unit of sediment reduction, the sediment rating of the 7th field watershed, and proximity to impacted aquatic habitat. Plates 9 - 13 show the proximity of high and medium ranked 7th field watersheds to aquatic resources for selected 5th field watersheds. Tables A3.3 –4 and a3.3 -5 provide a general sense of the relative cost effectiveness of various types of projects.

| Table A3.3 -4 - Cost per Ton of Sediment Reduction for Selected Management Changes on ML2 Roads | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Current Management | | Unit Cost & Reduced Sediment per Management Change | | | | | | | |
| | | | Restrict Use | | Convert to New Style | | Convert to New + Restrict | | Close | |
| Zone | Design Style | Wet Wx Use | Tons | $/T | Tons | $/T | Tons | $/T | Tons | $/T |
| Rain + Snow | Old | Unrestricted | 14 | $58 | 13 | $885 | 57 | $216 | 61 | $202 |
| | | Restricted | | | | | 43 | $267 | 47 | $245 |
| | New | Unrestricted | 44 | $19 | | | | | 48 | $17 |
| | | Restricted | | | | | | | 4 | $0 |
| Snow | Old | Unrestricted | 11 | $74 | 3 | $3833 | 33 | $373 | 38 | $324 |
| | | Restricted | | | | | 22 | $523 | 27 | $426 |
| | New | Unrestricted | 30 | $50 | | | | | 35 | $43 |
| | | Restricted | | | | | | | 5 | $0 |

| Table A3.3 -5 - Cost per Ton of Sediment Reduction for Selected Management Changes on ML3 Roads | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Current Managment | | Unit Cost & Reduced Sediment per Management Change | | | | | | | |
| | | | Restrict Use | | Convert to New Style | | Convert to New + Restrict | | Convert to New + Gravel | |
| Zone | Design Style | Wet Wx Use | Tons | $/T | Tons | $/T | Tons | $/T | Tons | $/T |
| Rain + Snow | Old | Unrestricted | 20 | $60 | 8 | $2,400 | 47 | $434 | 104 | $1638 |
| | | Restricted | | | | | 27 | $711 | 84 | $2014 |
| | New | Unrestricted | 39 | $31 | | | | | 96 | $1575 |
| | | Restricted | | | | | | | 57 | $2632 |
| Snow | Old | Unrestricted | 14 | $86 | 4 | $4,800 | 33 | $618 | 78 | $2185 |
| | | Restricted | | | | | 19 | $1,011 | 64 | $2644 |
| | New | Unrestricted | 29 | $41 | | | | | 74 | $2043 |
| | | Restricted | | | | | | | 45 | $3333 |

- As a starting point, focus on segments of key routes that are located 7th field watersheds that have high sediment ratings, since key routes have a larger road prism and have higher funding priority than other Forest roads.
- Consideration of cost per unit of sediment reduction in prioritizing multi-purpose road improvement projects will optimize their effectiveness in reducing overall road impacts.

- Submit the sediment findings of this analysis for consideration during the development of the TMDL implementation plan for the Upper Middle Fork Eel watershed. Follow the TMDL implementation plan when developed.
- Prioritize correction of fish passage barriers according to Table A3.3 –6.

*Terrestrial Habitat*

- Refer to Table 2.1- 2 for ratings of 5th field watersheds for potential road density induced fragmentation. Table A3.4-2 (pg A3.4 – 9) displays more detailed information for prioritizing watershed-scale analysis. Only the watersheds that rated high in both categories of all roads and open roads should have the highest priority (Thomes, Briscoe, Grindstone and Elder watersheds).
- The forest Noxious Weed Coordinator should establish effective roadside vegetation management program centering on the following priorities:
  - Monitor and quickly treat aggressive alien species (Weeds of the Mendocino N.F. 2002) upon their initial occurrence in the forest.
  - Re-survey road weed eradication sites for a minimum of 5 years because of seed banks.
  - Create weed-poor buffer zones on roadsides leading to the Wildernesses by grading away from the Wilderness perimeter.
- Consider the following criteria when prioritizing the decommissioning of unneeded roads:
  - Roads with little or no noxious weed infestation.
  - Spur roads within 1/2 mile of a wilderness area.
  - Backcountry spur roads located near sensitive plants or habitats.
  - Unclassified roads in inventoried roadless areas.
- The spread of the SOD by vehicle/soil vector is a serious concern, and means of entrance to the forest will most likely occur along the road matrix. The occurrence of the pathogen in the forest could lead to quarantine, road closings, public education and signage, vehicle washing stations, and restrictions of use permits. The Mendocino N.F should be prepared to work closely with county, state and federal authorities in the event of a quarantine.

*Heritage Resources and Traditional Uses*

- No recommendations at this scale.

*Health & Safety*

- Prioritize asbestos testing according to potential exposure ratings in Table A3.6-1.
- Prioritize any needed asbestos abatement projects according to results of testing.

*Effects on Roadless Areas*

- No recommendations at this scale.

## 2.2.3. Watershed and Project Scale Roads Analysis

*Affordability*

- Identify and prioritize road-specific opportunities to reduce road maintenance workload.
- Identify where culvert replacement needs are most urgent on unneeded roads.
- Identify opportunities where deferred maintenance work can also accomplish conversion of roads with old style design to new style.
- Identify roads with high recurring maintenance or repair costs, and opportunities to reduce those costs.
- Establish road closure mileage goals commensurate with expected funding levels and in conjunction with the determination of needed vs. unneeded roads. Justify deviation from the forest-wide goal of 15% of 2002 ML2 mileage. If the watershed goal is established below the forest-wide goal, then account for where on the forest the slack should be taken-up.
- Evaluate the effect of proposed road management changes on maintenance workload.

*Access*

- Where there are large private land in-holdings, work with the landowners to evaluate long-range transportation needs and opportunities to coordinate access.
- Inventory all unclassified roads and include in the assessment of needed vs unneeded roads.
- When identifying needed vs. unneeded roads:
  - Evaluate the extent to which each road is needed for resource management and protection, private land access, and recreation.
  - Consider existing road density, to the extent that adjacent roads may provide alternate access to an area.
  - List roads in order from most-needed to least-needed to assist road managers to minimize access impacts when prioritizing road closure and decommissioning opportunities.

*Water Quality & Aquatic Habitat*

- Applicable Forest Plan standards and guides: Facilities & Transportation # 6, 9, 15.
- Table A3.3 –26 lists the questions from the Roads Analysis Book (USDA Forest Service 1999) that need to be addressed at the watershed/project scale. The following points provide some insight into how to address some of the questions (the numbers of applicable questions appear in [brackets]). For some of the questions, forest-scale analysis produced no insights.
- [AQ-1, 2, 4, 6] At this scale, collection and use of road-specific inventory data is needed to estimate road-specific surface erosion sediment rates with WEPP:Road (or other suitable model). These values are needed to:

  - validate or correct the indicator-based rating of 7th field watersheds that was developed in the forest-scale analysis.
  - prioritize road sediment reduction opportunities.
  - compare the relative changes in sediment production between road management alternatives.
  - Adjust Equivalent Roaded Acre coefficients of roads in the Mendocino NF cumulative watershed effects database.
- Other survey/inventory needs include:
  - [AQ- 3] Existing and potential mass movement into streams - document sites and prioritize for improvement.
  - [AQ- 1]Identify stream diversion potential at culverts.
- [AQ- 7, 12, 14] Document the aquatic resource values (beneficial uses) that are most sensitive to road-related impacts, and their location in relation to verified impact sources. Use this information to prioritize impact reduction efforts. Use information in Table A3.3 –6 as a starting point.
- [AQ10] Fish migration barriers are well documented (Table A3.3 –7); watershed/project analysis should evaluate if/where migration of other aquatic species are affected.

*Terrestrial Habitat*

- In addition to reviewing terrestrial species habitat fragmentation from roads, also review the width of the roads, and the kinds of cuts and fills. All of these factors can influence how much of the habitat is actually fragmented.
- To determine effects of road density, the following type of information is needed:
  - When determining the amount of level one roads within the analysis area, make sure the roads are really closed to vehicles.
  - Include all roads in the area, including private roads.
  - Besides the amount of roads in an area, the duration and intensity of use is important for determining the effects of the roads. The timing of use may also be an important analysis factor.
  - Since wildlife species differ in their tolerance of road densities, the species of concern for the analysis area should be determined first and then the rating system developed to determine the affects to the species.
  - Assess the scale and intensity of road-related fragmentation as compared to other causes of fragmentation, such as timber harvest and wildfire. Evaluate whether road-related fragmentation is among the most limiting of causes, or if other causes must be addressed before reducing road density can be productive.
- Determine which terrestrial species are in the area that are sensitive to disturbance and whether the habitat for the species is made accessible by the roads or is affected by the roads and associated activities.
- Determine if unique habitat features exist in the area, such as serpentine soils, rocky outcropping or wet meadows. If present, then determine the

habitat quality, its potential for supporting species of concern and the potential for impacts associated with roads.

- Work with Forest Service law enforcement, game wardens and state biologists to determine the effects of illegal activities on local populations of terrestrial species.
- Develop maps of plant populations to be avoided while conducting routine road maintenance. This document and local knowledge should be shared with both Forest Service and county road crews to help protect these sites. Development of an on-site posting system would also be helpful.
- Work closely with neighboring County Agriculture Departments to identify road-related weed control problems.

*Heritage Resources and Traditional Uses*

- Applicable Forest Plan standards and guides: Heritage Resources S&G #6 (LRMP IV-23) .
- In planning for road decommissioning, closure, or opportunities to mitigate erosion and other treatments on Forest roads intersecting key route M1c within the Williams-Thatcher and Black Butte River watersheds, opportunities to protect historic properties should be considered.
- If the current access to the Bloody Rock locality provided by key route segments M1f, M1b, and M6; M1c, M61, and M6; or CA301, CA2408, M1b, and M6 might be changed through either closure, decommissioning, or lower maintenance standards, then the Round Valley Indian Tribes and other federally recognized tribes regularly consulted about Forest actions should be consulted to assess potential effects on current use and associated values.

*Health & Safety*

- Key routes or other high use roads through ultramafic rocks, such as serpentine, need to be identified and tested for asbestos.
- Key routes or other roads testing above the asbestos standard need to be identified in the Forest Road Atlas, and managed in accordance with the State Air Board regulations and County Air Quality District direction.
- Identify roads where dust is a health or safety concern, such as those with high traffic or near human habitation.

*Effects on Roadless Areas*

- Inventory unclassified roads within inventoried roadless areas and assess their impacts on roadless area characteristics. Also, include them in the assessment of needed vs. unneeded roads.
- Assess the potential need for new road construction in roadless areas (including addition of unclassified roads to the classified road system), and the effects such construction would have on roadless area characteristics. Timber harvest is the most likely activity for which new roads would be constructed, so the assessment should focus on the need to access forest

stands that have been allocated to timber management under the Forest Plan.

### 2.2.4. Construction

*Affordability*

- Applicable Forest Plan standards and guides: Facilities & Transportation #11, 12, 14.
- Assure that the long-term maintenance needs of proposed new roads can be supported by expected funding. Usually this will be done by assuring that the new construction will not prevent the achievement of the watershed's goal for reduction of ML2 mileage.

*Access*

- Applicable Forest Plan standards and guides: Facilities & Transportation #1, 2, 14.
- When considering new road construction, assure that the proposed new road is more needed than existing roads in the watershed that have been identified for closure or decommissioning.

*Water Quality & Aquatic Habitat*

- Applicable Forest Plan standards and guides: Facilities & Transportation # 5, 7, 8, 9, 11, 15; Soils & Geology # 2, 5; Watershed & Water Quality # 1c, 1d, 2a.
- Use WEPP:Road (or other suitable model) and site specific data to assess the efficacy of various design options in minimizing new sediment production.
- Avoid constructing new roads in 7$^{th}$ field subwatersheds that have verified high sediment impacts (as determined by watershed/project-scale analysis).

*Terrestrial Habitat*

- Whenever practicable, utilize the technique of stockpiling and redistributing local duff and topsoil during road construction. Whenever possible, post-road construction road bank stabilization and rehabilitation work should utilize the existing soil seedbanks and mycorrhizae that are well-adapted for that site. Redistributing the correct depth of soil and duff that has been stockpiled for up to one year can simplify and expedite efficient, site-adapted revegetation work during road-edge stabilization and re-habilitation of temporary roads. Use of certified weed-free mulch and native seed from appropriate seed zones should be standard operating procedure during road stabilization and revegetation work. Weed-free cereal grain alternatives may be appropriate when existing soil seedbanks already include significant amounts of aggressive introduced species.

- California grown, certified noxious weed-free native seed from appropriate seed zones should be utilized to the extent possible and practical.

*Heritage Resources and Traditional Uses*
- Applicable Forest Plan standards and guides: Heritage Resources S&G #3, 5 (LRMP IV-22).

*Health & Safety*
- Applicable Forest Plan Direction: Air Quality #1, 3 (LRMP pg IV-17); Facilities #1, (LRMP pg. IV-18).
- Continue to evaluate the effects of road maintenance and design on user safety when making project level road management decisions. When monitoring or other information indicates a potential road safety problem may exist, evaluate the need for corrective action.
- Road surface moisture, whether obtained naturally (rain) or by water truck will be necessary when road maintenance grading on key routes or high use roads through ultramafic rock types or until laboratory tests show the asbestos levels to be within the asbestos standard.

*Effects on Roadless Areas*
- No recommendations at this scale.

## 2.2.5. Reconstruction and Deferred Maintenance

*Affordability*
- Applicable Forest Applicable Forest Plan standards and guides: Facilities & Transportation #3.
- When conducting deferred maintenance of the road surface on in-sloped roads, take the opportunity to out-slope the road at the same time.

*Access*
- No recommendations.

*Water Quality & Aquatic Habitat*
- Applicable Forest Plan standards and guides: Facilities & Transportation # 5, 6, 7, 8, 9, 15.
- When doing deferred maintenance, seize opportunities to reduce width, outslope, remove berms, and decrease the distance between drainage dips and between ditch relief culverts.
- Continue to upgrade culverts to pass 100-year floods, especially in priority watersheds.

*Terrestrial Habitat*
- Stockpiling and redistribution of topsoil and duff should be implemented when possible during road reconstruction in order to assure that local seedbanks and mycorrhizae are utilized. The R-5 Native Plant Policy

should be implemented whenever possible during road reconstruction, soil stabilization and rehabilitation work.

*Heritage Resources and Traditional Uses*

- Applicable Forest Plan standards and guides: Heritage Resources S&G #3, 5 (LRMP IV-22).
- In planning for road decommissioning, closure, or opportunities to mitigate erosion and other treatments on Forest roads intersecting key route M1c within the Williams-Thatcher and Black Butte River watersheds, opportunities to protect historic properties should be considered.

*Health & Safety*

- Applicable Forest Plan Direction: Air Quality #1, 3 (LRMP pg IV-17); Facilities #1, (LRMP pg. IV-18).
- Continue to evaluate the effects of road maintenance and design on user safety when making project level road management decisions. When monitoring or other information indicates a potential road safety problem may exist, evaluate the need for corrective action.
- Road surface moisture, whether obtained naturally (rain) or by water truck will be necessary when road maintenance grading on key routes or high use roads through ultramafic rock types or until laboratory tests show the site to be within the asbestos standard.

*Effects on Roadless Areas*

- No recommendations at this scale.

### 2.2.6. Operation and Maintenance

*Affordability*

- Applicable Forest Plan standards and guides: Facilities & Transportation # 3, 13, 14.
- Maximize the use of wet weather use restrictions to reduce routine maintenance costs.
- Continue to cooperate with County and private road managers in maintaining the shared road system.

*Access*

- Applicable Forest Plan standards and guides: Facilities & Transportation #1, 14.
- In OHV areas and other areas of high wet weather use, consider using flexible rather than simple wet weather use restrictions to minimize impacts on road-dependent recreation access.

*Water Quality & Aquatic Habitat*

- Applicable Forest Plan standards and guides: Facilities & Transportation # 5, 10, 13, 15; Watershed & Water Quality # 1d.

- The existing standards established by the Forest Supervisor in the decision document Road Repair and Maintenance, CY1998 – 2002 are appropriate means of minimizing road-related sediment production. Continued adherence to these standards is recommended.

*Terrestrial Habitat*

- In areas with serpentine soils, it will be important to make sure not to use fertilizer when doing soil stabilization work.
- When conducting soil stabilization work that requires the use of seeding, it will important to work with a botanist to determine effects of the seeding on native plant species. As much as possible, it would be good to used local native plants for the stabilization work. If that is not possible, then the botanist can suggest other types of plants that should not displace native plants.
- Work with the road managers to promote weed free road maintenance and construction.
  - If possible, do not "import soil" from unknown or roadside sources for use in road maintenance; it may carry a weed seed bank.
  - Preserve native seed banks by scraping topsoil to the side and replacing it on top of disturbed soil.
  - Remove, if possible, soil and seeds from construction equipment before leaving infested work sites.
  - Notify the Noxious Weed Coordinator of work sites involving significant soil disturbance so the site can be monitored in the future.
  - The need for vehicle washing stations should be considered during project-scale analysis.
- During road maintenance avoid introducing or spreading weed seeds, and if possible preserve native seed banks. Non-native species seeded during road stabilization can out-compete and thereby cause the loss of native plant species.

*Heritage Resources and Traditional Uses*

- Applicable Forest Plan standards and guides: Heritage Resources S&G #3, 5 (LRMP IV-22).
- If the current access on NCT-associated segments of key routes FH7 and M4, or on Forest System road 20N02, might be changed, then the following federally recognized tribes must be consulted about the effects that this change would have on their symbolic, spiritual, and cultural uses of the Nome Cult Trail: Berry Creek Rancheria; Enterprise Rancheria; Grindstone Rancheria; Mechoopda Indian Tribe of Chico Rancheria; Mooretown Rancheria; Paskenta Band of Nomlaki Indians; and Round Valley Indian Tribes.
- If the current access on key route M1c might be changed, then the Round Valley Indian Tribes, and known Yuki spiritual and cultural practitioners who use the area, must be consulted about the effect such a change would have on their spiritual or religious practices, and access to sacred places.

- If the current access to the Bloody Rock locality provided by key route segments M1f, M1b, and M6; M1c, M61, and M6; or CA301, CA2408, M1b, and M6 might be changed through either closure, decommissioning, or lower maintenance standards, then the Round Valley Indian Tribes and other federally recognized tribes regularly consulted about Forest actions should be consulted to assess potential effects on current use and associated values.

*Health & Safety*

- Applicable Forest Plan Direction: Air Quality #1, 3 (LRMP pg IV-17); Facilities #1, 13a (LRMP pg. IV-18, 20).
- Road surface moisture, whether obtained naturally (rain) or by water truck will be necessary when road maintenance grading on key routes or high use roads through ultramafic rock types or until laboratory tests show the site to be within the asbestos standard.
- Manage for reduced dust levels where it has been identified as a health or safety concern. Possible practices include:
  - Schedule grading when soil moisture is adequate.
  - Provide water trucks when soil moisture is inadequate.
  - Apply dust palliatives.
- Roads on ultramafic rock types containing asbestos greater than the standard and within one mile of a receptor such as a campground, residence, or work station needs to be surface treated to reduce dust generation.
- Consult with tribal governments, local basket weavers, California Indian Basket Weavers Association, and other tribal contacts regarding any proposals to use herbicides on roadsides.
- Establish and maintain a contact list of individuals and organizations that are concerned about herbicide use on the Forest. Contact these people when conducting the scoping for any proposals to use herbicides on roadsides.
- Continue to evaluate the effects of road maintenance and design on user safety when making project level road management decisions. When monitoring or other information indicates a potential road safety problem may exist, evaluate the need for corrective action.

*Effects on Roadless Areas*

- No recommendations at this scale.

## 2.2.7. Closure and Decommissioning

*Affordability*

- Applicable Forest Plan standards and guides: Facilities & Transportation #4.
- Use gates or other removable barriers to close unneeded roads that have known culvert plugging risk, so that there is ready access for cleaning and

storm patrol. Decommissioning such roads would be acceptable if they meet other affordability prioritization criteria.
- Develop a schedule and funding strategy for closing 15% ML2 roads forest-wide. Adjust the schedule, strategy, and closure percentage goal as needed to reflect changes in funding and refinement of road maintenance cost information. The 15% figure should not be considered a fixed target so much as an interim estimate subject to change as circumstances change. The underlying objective is to bring the workload into line with available funding.
- Take advantage of opportunities to share closure costs by converting roads to trails.

*Access*
- Applicable Forest Plan standards and guides: Facilities & Transportation #4.
- Avoid closing roads with known culvert plugging risk, so that there is ready access for cleaning and storm patrol.
- Develop a schedule and funding strategy for closing 15% ML2 roads forest-wide. Adjust the schedule, strategy, and closure percentage goal as needed to reflect changes in funding and refinement of road maintenance cost information. The underlying objective is to bring the workload into line with available funding.
- Take advantage of opportunities to share closure costs, and provide alternative access by converting roads to trails.

*Water Quality & Aquatic Habitat*
- Applicable Forest Plan standards and guides: Facilities & Transportation #4, 6; Watershed & Water Quality # 1d, 2b.
- Consider cost per unit of sediment reduction, and risk of catastrophic failure when choosing between closure, minimal decommissioning, and full-blown obliteration.

*Terrestrial Habitat*
- Decommissioned roads are at risk of weed reinfestation, and should be surveyed annually for at least five years after closing to guard against weed occurrence, especially since drive-by surveys will no longer be possible.

*Heritage Resources and Traditional Uses*
- Applicable Forest Plan standards and guides: Heritage Resources S&G #3, 5 (LRMP IV-22).
- If the current access on NCT-associated segments of key routes FH7 and M4, or on Forest System road 20N02, might be changed, then the following federally recognized tribes must be consulted about the effects that this change would have on their symbolic, spiritual, and cultural uses of the Nome Cult Trail: Berry Creek Rancheria; Enterprise Rancheria;

Grindstone Rancheria; Mechoopda Indian Tribe of Chico Rancheria; Mooretown Rancheria; Paskenta Band of Nomlaki Indians; and Round Valley Indian Tribes.

- If the current access on key route M1c might be changed, then the Round Valley Indian Tribes, and known Yuki spiritual and cultural practitioners who use the area, must be consulted about the effect such a change would have on their spiritual or religious practices, and access to sacred places.
- In planning for road decommissioning, closure, or opportunities to mitigate erosion and other treatments on Forest roads intersecting key route M1c within the Williams-Thatcher and Black Butte River watersheds, opportunities to protect historic properties should be considered.
- If the current access to the Bloody Rock locality provided by key route segments M1f, M1b, and M6; M1c, M61, and M6; or CA301, CA2408, M1b, and M6 might be changed through either closure, decommissioning, or lower maintenance standards, then the Round Valley Indian Tribes and other federally recognized tribes regularly consulted about Forest actions should be consulted to assess potential effects on current use and associated values.

*Health & Safety*

- No recommendations at this scale.

*Effects on Roadless Areas*

- No recommendations at this scale.